Philadelphia Area Number Theory Seminar

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Periods of Iterated Rational Functions

Abstract: Choose a random polynomial f uniformly from among the $q^d(q-1)$ polynomials of degree d in $\mathbb{F}_q[x]$. Let c_k be the number of cycles of length k in the directed graph on $\mathbb{F}_q$ with edges $\{(v, f(v))\}_{v\in\mathbb{F}_q}$. In this talk, I will show that if $d = d(q) \to \infty$ as $q \to \infty$, then the numbers $c_1, c_2, \ldots, c_b$ are asymptotically independent Poisson$(1/k)$, just as in the classical theory of random mappings. Futhermore, if $\omega = \omega(q) \nearrow \infty$ slowly, and $d = d(q) > \exp\left(\frac{\log q}{\omega^{1/3}}\right)$, then for all sufficiently large prime powers q,

$$E(\mathbb{T}) > q^{\frac{1}{\omega}}.$$

A similar bound holds when random polynomials are replaced by random rational functions.

Thursday, April 7, 2016
2:40–4:00PM

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Tea and refreshments at 2:20PM in Park 355